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Situating a Prism to See 'All Colors': Evaluations of the E-school System in Türkiye from the Perspective of Educational Equity

Pınar AYYILDIZ*
School of Economics, Administrative and Social Sciences, Department of Management Information Systems, Ankara Medipol University, Ankara, Türkiye
ORCID: 0000-0002-2644-7981

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This research intends to delve into the first-hand information pertaining to learning analytics that belongs to PreK–12 education at micro, meso, and macro levels (Shum, 2012) in Türkiye from the perspective of equity in education through seeking to obtain the views of educational authorities and policy makers viz. school principals, the members of district national education directorate as well as those of Innovation and Educational Technologies General Directorate of MoNE (Republic of Türkiye Ministry of Education). To do so, adopting a qualitative route, the study attempts to inquire into the perceptions of the said groups i.e., 45 participants; in total-with 15 participants from each-about the role and place of the existing "E-school" structure that employs learning analytics towards the use of Big Data in Türkiye. This is realized particularly toward addressing and catering to students at risk alongside the disadvantaged. In this direction the research question is: "How do the decision-making bodies in Türkiye see the current E-school system as regards ensuring and sustaining educational equity?". The semi-structured interviews aim to direct questions e.g., respecting the situation with school dropouts, the cases of students with special needs, the situation of those who are struggling and of refugees. The findings indicate a superposition; an entangled being of inherent disadvantages and that the present system needs to be further amended to better care for 'all' to speak of equity. This study will cast light on the potential value of learning analytics regarding its use for targeting/solving equity problems through the expert opinions from a developing country with highly dynamic demographics.

Introduction

Innovations in science and technology accelerate the transition of societies into the digital age ensuring their digital transformation. Nowadays, digital transformation affects and shapes almost every aspect of our lives. As a result of this, the field of educational services also takes its share of this situation (Hussin, 2018). Whilst providing educational services, many novel concepts have entered our lives with the advent of technology (Rienties & Jones, 2019). The most common of these is the notion of *"Education 4.0"* (Dulger, 2020). Education 4.0 is

* Correspondency: pinar.ayyildiz@ankaramedipol.edu.tr

generally described as the reflections of digital transformation movements in the world of education (Düzenli-Cil et al., 2022; Oztemel, 2018). Education 4.0 offers an intensive digital application service leaving behind digital waste i.e., outputs and data and digital footprints (user movements, personal preferences). In today's digital age, these traces are of great importance and even the 'atom' of the new generation is defined as *"data"* (Wong et al., 2019).

As technological and digital-based applications are utilized in educational services, extremely big amounts of data are generated and stored daily. Howbeit, these data are not only digital waste but also the results of new-generation applications that are as valuable as "gold dust". The type of data resulting from using digital applications in educational services is entitled "educational data" (Uysal, 2021). While educational data has been at the forefront recently, its very being has become even more critical with the Covid-19 pandemic. Because the Covid-19 pandemic has both made the use of digital applications and online education environments mandatory also making it compulsory for people from all walks of life to learn how to make use of the available digital applications. As a matter of fact, with the Covid-19 pandemic, learning management systems, online meetings, virtual learning activities, artificial intelligence applications, and a fair number of other digital education applications have become indispensable (Koca, 2019). This has contributed to creating a rich(er) data pool for both decision-makers and all stakeholders in the provision of educational services with the help of information technologies. That said, this data pool is much larger than expected, and it is not that easy to control or make sense of it. At this juncture, the term of "analytics" come into play.

Analytics can be defined in the simplest fashion as creating models to find the meanings attributed to data, discovering hidden structures, and transforming them into a form that everyone can understand (Ayyıldız & Yılmaz, 2021; Tutsun, 2020). Analytical processes can define a problem; a situation can be made sense of, or mass data can be interpreted and transformed into a more straightforward form (Bond & Dirkin, 2020). Doing so offers decision-makers at the national level and other bodies and parties at the institutional level the invaluable opportunity to make more effective decisions and timely interventions when providing educational services. Analytics are indeed encountered in a number of fields, particularly in education services, and are divided into four different subcategories. The categories in question are descriptive, diagnostic, predictive and predictive analytics (Kaliisa et al., 2021). Whereas descriptive analytics is mainly referred to with a view to determining the situation and summarizing the current structure, diagnostic analytics are more common in implementations requiring treatment and intervention. On the other hand, predictive analytics enable interventions to be resorted to through the existing data in case of a newly encountered situation.

Among analytics, predictive analytics is the most frequently used type, especially towards providing educational services. With predictive analytics, existing data are examined and analyzed, and in light of the results obtained, managerial decisions are made in a calculated manner, and the necessary interventions are planned accordingly (Greller & Drachsler, 2012). So as to be able to employ predictive analytics, it is deemed crucial to control the rapidly increasing amount of data and to master the field called big data (Holmes et al., 2019). The construct of big data consists of five components. These are the 5V, namely, variety, velocity, volume/data size, verification, value (Takci & Aydemir, 2018). At this point, learning analytics emerge as an eminent medium to make sense of big data.

Learning Analytics

Learning analytics is oftentimes deployed to cope with educational data generated at an unbelievable rate (Ferguson, 2012; Ayyıldız &Yılmaz, 2023b). Learning analytics owns a complex structure and combines plentiful sub-disciplines e.g., computer science, educational data mining, learning sciences (Siemens et al., 2013). Metaphorically speaking, learning analytics is similar to the human body's nervous system structure. The nervous system can extend to the most sensitive points of our body and warrants instant notifications helping us produce behavior, react, or avoid severe injuries by showing reflexes. Within this frame of reference, it would be fair to say that learning analytics also constitute the *"digital nervous system"* of the education system.

Learning analytics are in a critical position vis-à-vis receiving feedback at various levels while assuring educational services, in making interventions in the short-medium-long period, in planning the steps to be taken for the future and when making immediate decisions and producing solutions (Rienties et al., 2016). Learning analytics support systematic and logical decisions by paving the way for evidence-based feedback which is to be shared with policymakers, education practitioners and decision-makers (Somyurek et al., 2021). In this respect, learning analytics points to the formation of sound predictions. In fact, it is worthwhile to accent that learning analytics can be used at all levels of educational services, from pre-school to higher education (Adejo & Connolly, 2017).

The use of learning analytics in providing educational services can be described as a *"paradigm shift"* in a sense or *"using a new pair of glasses"* (Clow, 2012). This is because learning analytics simplifies rather complicated and massive data and makes them more meaningful. To wit, it contributes to revealing invisible constructions and to determining the relationships between data. For sure, this assists in enhancing success eliminating system deficiencies (Brown, 2012). With learning analytics, online applications and digital data are systematically examined and analyzed, and evidence-based improvements can be made (Karaoğlan-Yılmaz, 2020; Yılmaz, 2024). It is noteworthy to underpin herein that there exists a cycle in the learning analytics process. This cycle can be expressed as learners, generated data, analytics (measurements/visualization) and interventions (Tutsun, 2020). The learning analytics cycle starts with learners, and the data obtained in this process are analyzed and made meaningful with the help of the relevant analytics. In the last stage, the required interventions are spotted, and educational services are made healthier. When the cycle is completed with learning analytics, the existing situation is improved, or the effect of factors that may negatively affect the system's functioning is minimized (Long & Siemens, 2014). Learning analytics is acknowledged at various levels in the field of education. In the study conducted by Shum (2012), it was pinpointed that learning analytics can be used as micro, meso and macro analytical layers. Each level covers a data set of dissimilar size and addresses varying contexts. Figure 1 below displays the learning analytics cycle (Tutsun, 2020) and the level of learning analytics (Shum, 2012).

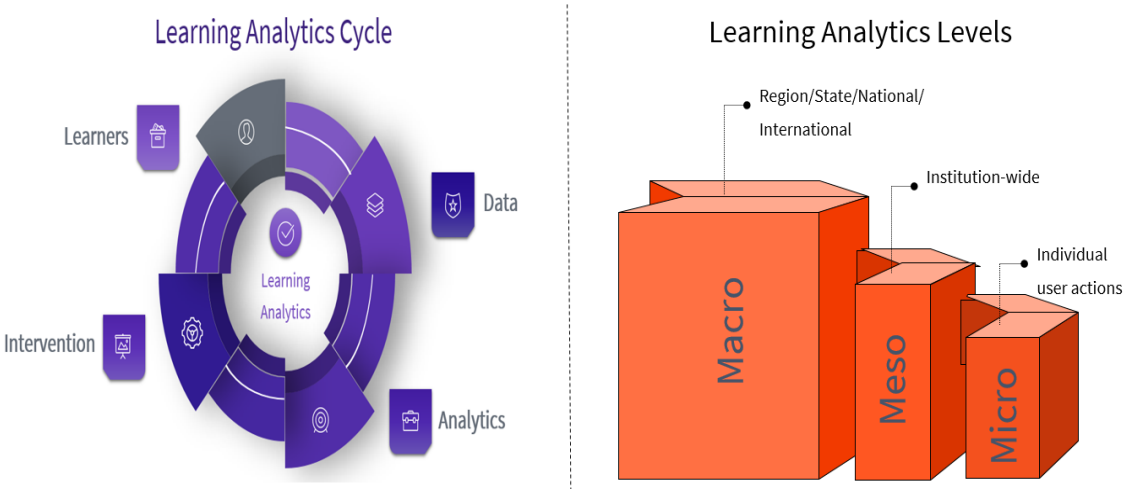

Figure 1. Learning analytics cycle/levels

Figure 1 shows clearly that learning analytics can be in use at the macro, meso and micro levels. As one moves from the micro to the macro level, the data volume grows, and the effect size of analytics increases in an inevitable manner. As we move from the macro level to the micro level in the mirror image, there is a tendency to move from mass applications to individual applications. Although the contribution of each level to educational services differs, the common aim is to improve and sustain educational services. The contributions of such levels are as follows (Shum, 2012, p.7):

The contributions at the micro level:

- Identifying learners at risk and providing interventions.
- Providing learners with information about their own learning habits and suggestions for improvement.

The contributions at the meso level:

- Improving administrative decision-making and organizational resource allocation.
- Making sure of accessing more transparent data and maintaining a better understanding of complex issues through combinations of analytics.
- Supporting holistic decision-making by better understanding the impact of diverse variables.
- Targeting organizational productivity by providing up-to-date data and rapid responses to changes.
- To help leaders decide on the value of faculty activities.

The contributions at the macro level:

- Ultimately, the items listed above can transform the education system through deploying several academic models and pedagogical approaches.

In addition to these functions of learning analytics toward educational services, there are some points to consider. In particular, it is criticized that the data structure is not natural, that is, it is not a direct human-oriented result (Chaudhuri et al., 2011). Automating human behaviors and basing them solely on data, explaining the definition of knowledge with digital concepts, having doubts about impartiality and accuracy in the process of data supply, accepting all data at the

same value, the fact that not all accessible data contain ethical values and big data can only be accessed by a particular segment are amongst the undesired aspects of the process (De Liddo et al., 2012). Considering the criticisms directed to learning analytics, the present study analyzed the *"E-school"* application performed for PreK-12 level in Türkiye as a form of learning analytics tool at micro, meso and macro levels. For this reason, giving information about e-school applications would be meaningful at this point.

E-school Application as a Learning Analytics Tool

In parallel with the rather rapid changes in information technologies, access to information is no longer meaningful on its own. Addedly, the information needs to be processed, analyzed, and sectoral plans must be made wisely. In Türkiye, specifically after the 2000s, the usage of digital applications has boosted, and digital transformation practices have been initiated to compete with the other countries. To access accurate and complete information in the provision of education services, to preserve data integrity in decision-making processes and to make rapid decisions based on evidence, the State Planning Organization (SPO, 2005) initiated projects and practices that can form the basis for the *"information society"* (Saritas et al., 2013). With these applications, up to date implementations of public institutions and organizations were realized.

With the development of internet technologies, applications such as *"e-Government"* and *"e-Transformation"* have started to be mentioned more in documents and educational spheres (Aysin, 2007). In this context, the "e-Transformation Türkiye Project", which has been implemented in Türkiye, attempted to create a state structure through which citizens can transparently and actively participate in the procedures and effectively receive public services (SPO, 2006). In Türkiye, Republic of Türkiye Ministry of National Education (MoNE) controls and coordinates all education services. Within the scope of digital transformation practices, the "Ministry of National Education Integrated Management Information System (MoNEIMIS)" was first founded, which allows for all the managerial activities to be controlled from a single point. This system is the first system executed as a learning analytics tool in education services. With that being said, since this system was designated especially for administrative operations at the Ministry level, it does not entirely fit the nature of learning analytics. Later on, the "E-school Management Information System" project, which was launched by MoNE to provide school and student management similar to that of the MoNEIMIS structure, was put into practice in the year 2007. The e-school system has been enriched with so many improvements and innovations since the first day it was designed and is being developed regularly. As a matter of fact, the E-school system is a comprehensive application that contains personal information of students, student files, transfer procedures, progress reports, course programs, information pertaining to teachers and examinations and other types of data. Figure 2 demonstrates the interface for the E-school application.

Figure 2. E-school user interface (URL-1, 2023)

With the e-school application, student transactions, school transactions, provincial and district directorates transactions, and Ministry-level transactions can be carried out as desired. Both administrators and families as the immediate stakeholders can use the E-school application as well. With that being said, one of the most essential features of this system is that it brings about transparency for the education services processes and gives rise to interactivity. At the same time, a considerable number of distance education platforms can be integrated into this very system, during times of crises like the Covid-19 pandemic. Integrating other education services units, such as Education Informatics Network (EIN) and the Teacher Informatics Network (TIN), into this system enables the acquisition of a high volume of data as a learning analytics tool. E-school application is actively used at present and appears as the most frequently used information source as a learning analytics tool.

A Review of The Literature

Research on E-school in Türkiye

Apparently, the studies on e-school applications cluster under diverse subjects in Türkiye. When the studies in question are analyzed according to the subject areas, the uses can be grouped in the following way: technical evaluation of E-school system (Inan et al., 2017), cost-benefit analysis for e-school application (Yilmaz, 2010), determination of administrator and teacher opinions on the use of e-school system (Saritas et al., 2013; Yilmaz & Akbaba, 2013), evaluation of e-school system with eye-tracking method (Mutlu-Bayraktar, 2017), data-based school management studies (Ayyıldız & Yılmaz, 2023a; Oz & Arastaman, 2022) and the use of e-school applications in the evaluation of school success of intellectually disabled children (Tuncay & Polat, 2019). Arguably these studies are at the local and regional level in terms of both the application area and sample size and regarding the data they offer. What is more, thr e-school applications are not subject to a nationwide study. On top of everything, no study involving decision-makers or policymakers seems to exist. This hints at the fact that the existing research casts light merely at the micro and meso levels.

Importance of The Study

Without doubt, Türkiye is a highly dynamic and developing country. In this framework, numerous innovative practices have been implemented to compete with the developed countries and to improve education services' quality. Digital transformations have been achieved at a mass level in providing education services to eliminate inequality in education. In the line of

literature, there are not enough studies on learning analytics or on eliminating inequality in education for Türkiye though. Through the current study, both the e-school application, which is a mass learning analytics tool, will be investigated from a different perspective (at micro, meso and macro levels) and the attitudes and opinions of administrators, decision makers and policymakers towards learning analytics will be explored thoroughly.

In this direction the research question is: "How do the decision-making bodies in Türkiye see the current E-school system as regards ensuring and sustaining educational equity?". The semi-structured interviews plan to direct questions e.g., respecting the situation with school dropouts, the cases of students with special needs, of those who are struggling and of refugees.

The findings indicate a superposition; an entangled being of inherent disadvantages and that the existing system needs to be amended to better care for 'all' to speak of equity. This study will shed light to the potential value of learning analytics as regards its use for targeting/solving equity problems through the expert opinions from a developing country with heterogenous demographics.

Methodology

This study discusses how the e-school system works as a learning analytics tool from distinct perspectives. To this end, the main question is: "How do the decision-making bodies in Türkiye see the E-school system with regard to ensuring and sustaining educational equity?". The information obtained within the scope of the research was collected in specific periods attaining first-hand knowledge. These periods are determined as the preparations for a new academic term, during the term and at the end of the term. In the research, five open-ended interview questions were posed to the decision-makers at each level. The answers to these questions were then enquired into in micro, meso and macro dimensions. A qualitative research approach was embraced in this study with the theme of education equality. Gathering the existing information first-hand in its natural environment and without interfering with its structure constitutes a prominent aspect of the study (Cohen et al., 2018). The data reached that pertain to this study, in which learning analytics was also investigated, could go from individual to mass interventions.

Research Group

In this study, through which the impact of learning analytics is examined by considering the principle of equality in education, ultimate care was taken to invite the decision-makers at micro, meso and macro levels to the study group. Thereupon, 15 school principals as micro-level decision-makers, 15 administrators working in provincial and district national education directorates as decision-makers at the meso level, and 15 administrators working in Innovation and Educational Technologies General Directorate of MoNE as macro-level decision-makers were recruited as the participants. The purposive sampling method was selected while determining the research study group mentioned. Thence, it was essential to specify the decision-makers working at the micro and meso levels from the individuals working in seven different geographical regions of Türkiye and to create diversity according to the capacity of the relevant cities. It is of utmost importance to accentuate that decision makers at the macro level who were situated in the capital, that is, Ankara were invited to the research as they worked at the ministerial level.

Data Collection Process

The implementation process was conducted in three stages. The first stage consists of the preparation for the new term, that is, the opening of schools and the onset of the new term. The participants in the study group of the research were told to record what work and transactions they were engaged in within the first three weeks of the academic year and to keep them prior to the interview. There was little intervention in the macro working group at the ministerial level as the current situation progressed within the framework of more formal procedures.

The second stage encompasses the period in which the intra-term transactions are performed during the education and training processes. At this stage, the participants were asked about what work, and procedures were notable between the 4th and 10th weeks of the new academic year and were requested to keep the records of these for the interviews to take place later.

The third stage is the stage where the end-of-term transactions are made. At this stage, the interviews were held about what was actually done between the 11th and 15th weeks and how the education and training process was terminated for the term. Great care was taken at all the stages of the research to make the participants feel comfortable and to ensure a non-threatening environment. Furthermore, it was secured that the participants' views would be kept anonymized. In all the three stages of the research, the interviews were made one-to-one basis and were all voice recorded.

Analysis of the Data

For this study, which included three levels of participant groups and three implementation stages, the interviews were first transcribed verbatim. A circular coding process suggested by Braun & Clarke (2023) was preferred to form a central idea and identify sub-themes as a result of the interviews. During the coding process, peer briefing was also referred to. The decoded documents were sent back to the related participants, and they were told they could make adjustments when/if necessary. During the analysis of the data, the identities of the researchers were kept anonymized and coded as MicroL1, MicroL2… for the micro level, MesoL1, MesoL2… for the meso level, and MacroL1, MacroL2… for the macro level. Since there was a comprehensive interview data set in the research process, a set of systematic steps were also followed to analyze the data. These steps announced by Robson and McCartan (2016) are: Getting acquainted with the application data and general classification of the data (first rough distinction), preparing the first codes, deciding on the application patterns, monitoring the circular coding, revealing the thematic networks, and finally integration and interpretation.

Validity, Reliability and Ethical Considerations

The studies in the field of educational sciences for which the qualitative routes are chosen always necessitate relatively more attention as respects to trustworthiness, rigor and ethical issues.

Primarily, in line with both validity and reliability criteria, the codes/themes were formed by following a cyclical process and a series of specific systematic steps. Here, the audio recordings were meticulously written down without missing any word, direct quotations were shared from time to time, sufficient time was allocated for each interview and care was taken to conduct inductive data analysis. Further to these, the transcribed interviews were sent to the participants, and they were asked to check them and make changes as they wish.

The coding was done in line with the data obtained in the application, and a cyclical coding process was executed. These processes were later determined by the formula put forward by Miles and Huberman (1994), and the level of the agreement between coders was figured out as 91%. This quite high level of coherence indicates that the codings are valid.

During the reporting phase of the application results, it was assured to present the findings in English affirming accurate and appropriate translations of the direct quotations. Since the researcher herself is a translator, she took an active role in this process. Afterwards, the translations were sent to another competent colleague in the field and cross-checks were done.

As for the ethical dimensions of the practice, it can be uttered that the researchers attempted to carefully manage this process. First off, the necessary legal permissions were obtained for the interviews and the audio recordings to be taken, and then the essential information was provided for the participants by obtaining the signed consent of the participants. It is worth noting that the participants were all anonymized, and all the practicum was within the framework of the law on the protection of privacy and personal information.

Findings

The findings of this research, which was completed employing a qualitative paradigm, are outlined in three sections. These sections are classified as the preparation for the new term (first three weeks), education and training process (4-10th week) and end-of-term procedures (11-15th week). Aside from this, each section was handled apropos of micro, meso and macro groups. The school administrators at the micro level, the administrators working in provincial and the district national education directorates at the meso level, and the ministry-level administrators at the macro level expressed their opinions. While presenting the findings that pertain to the applications, a handful of direct quotations were made accessible from time to time.

Stage 1: The preparation for the new term (first three weeks)

At this stage, the decision-makers were asked the question: "What kind of transactions do you perform with the e-school system for the preparation for the new term? Do these transactions warrant equality in education for all students?".

Findings obtained at the micro-level

The findings that pertain to the micro level demonstrate that almost all of the school administrators gave similar answers to the question. It is articulated that student registrations, school transfers, class and teacher assignments are realized, and student files and personal information are created in the preparation phase for the new term. Also, as the e-school system allows to see transfer students' educational backgrounds, penalties, grade point averages and alike it is possible to have some information about those students even before they come to their new school. The participant coded MicroL2 punctuates:

> *All our students are just the same for us. Nevertheless, the e-school system helps us to make some predictions in advance. For instance, seeing the penalties, grade point average, absenteeism, and treatments a student has received in their previous education life makes us have a preliminary preparation. With this feature, the e-school application supports us to better situate a student and increase the likelihood of their integration. That being said, these services are for all students. In other words, students living in rural areas undergo*

> *the same preparation procedures with the ones in metropolitan areas undergo the same procedures.*

On the other hand, contrary to what the above participant mentioned, the participant with the code MicroL9 stated that the e-school system might cause problems in metropolises:

> *Our school approximately hosts 4500 students. We enroll a large number of students every year. Unfortunately, there are a lot of sections to be filled in the e-school system and we cannot complete these processes for weeks. This is really time consuming.*

The school administrators shared dissimilar opinions about the positive and negative dimensions of the e-school system. To illustrate, they uttered that at the end of the first three weeks, the general structure of the school gradually begins to materialize, the issues that pertain to the missing classrooms, course overlaps, course loads of teachers and absenteeism are resolved. At the end of the first three weeks, it is also vocalized that the intervention steps start to be taken thanks to the e-school application, and the deficiencies of the educational services are targeted. The participant coded MicroL11 made the following statements:

> *The first week of our school is usually spent with the orientation, information giving processes and document-related procedures together with student registrations. The second week is the week when our teachers and students begin to get together, the classroom needs are determined, and the first set of feedback is received. The third week marks the week when the system is settled, and the educational services are moving forward. This week is a turning point for us. Because the bigger picture starts to take shape in this week. For this reason, at the end of the third week, thanks to the e-school, we can analyse all the necessary learning needs and make the interventions on time so that we can speak of equity and equality.*

The school administrators underlined that the e-school system provides some information germane to learning analytics at the end of the first three weeks. This implies that at the micro level, the e-school system does not create any negativity regarding equality in education for students of the different regions of Türkiye.

Findings obtained at the meso-level

When the findings obtained at the meso level are dwelled upon, the administrators working in provincial and district directorates seemed to be giving answers of similar sort to the relevant question. The administrators at the meso level are not in direct communication with families or students like school administrators. At this level, a more hierarchical order is followed. The participant coded MesoL6 revealed the following about the procedures related to the e-school system at the meso level:

> *The e-school system gives us very accurate information about the salient elements thanks to information technologies. The first three weeks are of crucial importance for preparing for the new term as during this period, our schools that need more teachers are determined, and our occupancy rates and enrolment levels are specified. This means we can address individual schools and even individual groups that need attention in varying means. From this point of view, we can comfortably say equality in education is attained to a large extent during these first three weeks.*

Some administrators pronounced that the information provided by the E-school system in the

preparation phase of the new term is not completely clear even though these first three weeks are critical. The views of the participant coded MesoL12 are presented below in this sense:

> *Our schools' conditions and even transport facilities are not the same in all of the regions in our country. This may interfere with school registrations and also with teacher mobilizations. Hence, it may be misleading to wholly rely on the information we get within the first three weeks.*

Another administrator at the Meso level punctuated that the data coming through the e-school system are mostly clarified at the end of the term and that these learning analytics are not used much at the beginning phases of the term. The views of the participant coded MesoL8 are below:

> *The e-school system is already quite comprehensive and continues to be more complex. The data obtained through the E-school system are essential for making comparisons and situation assessments at the end of a semester. Thereupon, we can highlight that no inequality problems occur during this preparation stage for the new term.*

Findings belonging to the macro-level

Since the findings linked to the macro level are at the Ministry level and affect the whole country, it seems that comprehensive work is taking place for the preparation for the new period. The participant coded MacroL3 limelighted these on the subject:

> *We control the system at the ministerial level and coordinate the actions that need to be taken across the country. Therefore, the first three weeks are vital considering the accountability of the state and policymakers. To ensure a smoother initiation of the education services, E-school data can be checked daily. Only in doing so can we talk about equity.*

The E-school system is utilized more intensively at the Ministry level in the preparation for the new term. There are factors that impact both policymakers and the country and it may be critical to be alert at any time. The participant coded MacroL8 made a technical comment on the topic:

> *As the Ministry, we have to both analyze the data belonging to the E-school system and create technical conditions to warrant that the E-school system offers an effective service. We need to make the announcements during the preparation step towards the new period, to update the added or removed legal conditions, and to verify that the services are provided uninterruptedly in times of disasters such as the quakes we experienced. The media that provide mass learning analytics data, such as the E-school system, is really handy in such times to control all students' safety and learning.*

It is understood that the system is seen as efficient in preventing the disruption of education services via ensuring equality in education.

Stage 2: Education and teaching process (4th-10th week)

In the second stage, the decision-makers were asked: "What kind of transactions do you do with the E-school system in the education and teaching process? Do these transactions guarantee equality in education for all students?".

Findings of the micro-level

After the preparation period, the instructional work starts. At the micro level, the participants remarked that at this stage, the transactions such as allocating educational materials for students, supervising the absenteeism records, meeting the needs of teachers, and supervising the follow-up of daily, weekly, and monthly transactions are managed. In this period, fewer transactions are observed compared to the preparation phase for the new semester. Because the system is considered working, and the procedures take place. In this regard, it is also clear that the administration of some transactions through the E-school system, EIN, and TIN may cause problems from time to time. Particularly in situations such as natural disasters or crises, the adequate provision of education services and the elimination of deficiencies may cause an intensive labor force for the responsible parties. Aside from this, inequality can emerge in access to these services. The participant coded MicroL7 recounts:

> *Whereas the E-school oftentimes backs up us to speak about instruction's being equal and fair for all, ironically some activities that occur via E-school and online environments, such as EIN and TIN, may create inequity in education because problems like not being able to access digital media e.g., due to insufficient internet quota or the lack of technological facilities and infrastructure in schools and homes can add onto the existing matters.*

The participant coded MicroL5 stressed that the E-school system could not be used effectively by teachers in schools with overcrowded classes and that the data gained with this system may contain errors then:

> *Our school is quite large, and some classes are very populous. This means that our teachers have additional workload, and that they cannot enter all the needed information onto the E-system on time. At the same time, sustaining the timely use of the E-school system is a complicated issue involving teacher motivation. While some use the system very well, others enter limited information about their students into the system. This indirectly causes inequality in the formation of student portfolios.*

As can be seen, the storage of mass data cannot guarantee secure form of information. This indeed is frequently emphasized in the line of literature as one of the weaknesses of learning analytics. The school administrators emphasize that the e-school system should be used efficiently, resorting to their technical awareness, and do so in a timely fashion.

Findings for the meso-level

It is underscored that routine and procedural operations are valid for the meso level during the education and training process. It is also indicated that the changing needs of schools are met, plans are made at the provincial and district level, and crisis management is monitored, and the eminent interventions are made when unexpected situations are witnesses. What MesoL13-coded participant italicized is worth sharing at this juncture:

> *Being the managers working in provincial directorates, we are intermediate-level managers. This gives us a more advantageous position than those at the lower and ministry levels. This is because we undertake the role of communicating and mediating in the advancement of the education process. E-school system can provide us with intermediate outputs in the process. We can interpret the routinely communicated information about the modus operandi to address issues that are equality related. To give an example, we can see*

> *the absenteeism records and exchange opinions with the related school principals about the interventions to be made in terms of school dropouts.*

The groups at the meso level do not have experience issues with the e-school system. This is on account of the fact that they are not directly involved in the 'countless tasks' unless there is an extraordinary situation. In case of problems, they identify the needs of the lower level and pass these onto the senior management. They seem to be using the E-school data frequently and work to eliminate inequalities to rise. The viewpoint of the participant coded MesoL2 may be enlightening:

> *The Covid-19 pandemic has proved us how significant the E-school system is. Because the most accurate information to get to meet the needs of our schools can be made possible through this system. Nonetheless, since we are not as active as school administrators, we are engaged in the interventions less.*

Findings of the macro-level

Being at the macro level brings greater responsibilities for all levels of education services. Ministry-level services are expected to be effective to the greatest extent possible. This is because every decision taken carries the potential to influence the whole country in one way or another. Taking into account this realm, the participant coded MacroL1 points out these:

> *Every stage of the education process is prominent for us. Because any disruption of education services at any stage can hold us directly responsible, what is more, accountable. Especially the Covid-19 pandemic and the natural disasters we have frequently experienced in the recent years cause us to think carefully about every step we take. The instant decisions made to during crises rather quickly can turn out to be a bad one for some individuals or some schools. This is undoubtedly linked to equality issues. So, the active use of the E-school system by all the responsible parties in line with their duties and online monitoring of the related applications are so central yet doing so is itself a problem of equity in some situations.*

At the macro level, there may be some problems with the E-school system. The e-school system is a multifaceted platform where thousands of transactions can be performed for a student. To exploit this platform, intermediate, and lower-level users should possess a certain level of digital literacy apart from their access to the minimum infrastructure. Otherwise, the data cannot be entered into the system correctly, and incorrect versions of the data pass onto the macro level. The participant coded MacroL15 brings out this:

> *Briefings, information notes and educational content is overseen at the macro level. The top management asks for such preparation on a regular basis. In these cases, a snapshot of the most recent status of the services provided and the procedures should be made visible. But when intermediate and lower-level managers do not have sufficient computer and digital literacy, provided incorrect or incomplete data entries are made, problems begin to appear. Like a snowball, these issues lead to unwanted consequences at the macro level. The blocks in the information flow interrupts the actions to be taken toward eliminating inequality as well. To cite an example, the number of the refugee students in each school should be updated by the schools for us to cater to their unique needs in fighting against equality in a more cooperative and collaborative manner. On top of all these, this is a must for sustainability.*

For sure, the services offered at the macro level should have less error margin than any other

service groups. This is owing to the fact that it is the macro level that controls and manages the system to make improvements. Alongside this, the mistakes made at the macro level can bring large scale damages. Thence, the use of E-school also at the macro level is definitely a requirement in the education and training process.

Stage 3: End of term procedures (11-15th week)

In the third stage, as part of the end-of-term procedures, the decision-makers were asked the question: "What kind of procedures do you perform with the E-school system during the end-of-term procedures? Do these procedures ensure equality in education for all students?".

Findings obtained at the micro-level

Unlike the preparatory period, the end-of-term procedures make up the stage where the final designs for educational services are completed, and in which the general evaluations are made. This stage is perceived at the micro level as the tasks to be fulfilled in a certain period of time. Mostly, grade entries, determining absenteeism records, reporting the procedures conducted during a semester and the evaluation of student performance takes place at this stage. The views of the participant coded MicroL6 guide us:

> *After the information entries are made to the e-school system, a decision framework is generated for all the students and courses. This provides information on absenteeism, the tendency to drop out of school, and the areas in which students fail and where at-risk students cluster.*

The participant coded MicroL8 accented that the end-of-term processes unearth students' family background, achievement levels, problem situations, needs and other types of useful information about them:

> *When the end-of-term procedures are completed on the E-school system, lots of formerly invisible information about students is revealed further. This is like what comes out of "Aladdin's Lamp", which permits to make healthy interventions to eliminate inequalities in education both for shorter and longer terms in a magical way.*

There are also benefits provided to decision-makers by the E-school system. It particularly creates a rich data pool, such as the information about the performance of teachers, the duration of classes, the success rate in national and international exams, and the outside class work carried out during the semester. In this respect, the E-school system merges information about the curricular and co-curricular tasks together with extracurricular activities through which one can make inferences about inclusion, equality, and equity in education.

Findings obtained at the meso-level

When the end-of-term procedures at the meso level are considered, successful schools are identified at the provincial and district level, the effective administrators are identified, a general evaluation is made, and reports are prepared at the Ministry level. The opinions of the participant coded MesoL1 on this are as follows:

> *At the end of the term, an intensive evaluation process begins. Innumerable evaluations, such as exams to be held at the provincial and district level determining the success of schools and students, choosing the investments to be made in the new year and others are made then. The e-school system becomes more essential in this period. Because this is the*

> *stage where reports and evaluations are finalized. Any mistake made at this point can unfortunately spread to the whole system.*

The participant coded MesoL5 points to that teachers are systematically given 'too much' workload in this period, which causes inaccurate entries to be added into the database:

> *The e-school is updated and made compatible with innovations. Yet, since it is a data source at the end of the day, entering too much information into this system prevents it from working well. Besides, and rather paradoxically, the additional workload created by the slowing down of the operations can turn into inaccurate or incomplete information flow in the longer run.*

Findings obtained at the macro-level

As mentioned in the previous section, being at the macro level brings greater responsibility for all the stages of education services. The end-of-term procedures are the most intensive procedures at the ministry level. That is because it is of utmost importance to make evaluations and interventions on many issues, such as the termination of education services throughout the country, the establishment of national and international education indicators, and the follow-up of quality standards. In this direction, the participant coded as MakroL4 asserted the below:

> *With the end-of-term transactions, the general success indicators of the country are formed, and the holistic picture becomes clearer for all of us. Thusly, the most important benefits of the E-school system turn out to be these: In which regions and cities and at what levels are drop-outs occur? Likewise, to what extent are the needs of the students with special needs met? How is the quality of education services provided, say, to the earthquake victims? What kind of improvements can be made in those regions with irregular migration? To what extent have the children of seasonal agricultural workers been included in education?*

As can be seen, the e-school system casts light to tremendous data and help gaining insights into the ways through which eliminating the inequalities in education at the macro level can be realized. Running all these operations through a single application is very effective in learning analytics. With that being said, some additional measures need to be taken to control such a high volume of data, to certify the sustainability of the system and to carry out the transactions in a healthy way. On this, MakroL7 interlineated these:

> *E-school system is an indispensable analytical tool for eliminating inequality in education. On the other hand, the protection of this system from electronic attacks, the storage and the preservation of such huge volumes of data generated daily, and the enrichment of the system with applications such as artificial intelligence platforms all call for a working team. One that is harmonious. The managers at intermediate and lower levels should be conscious and highly aware of the system's development too. Or else, the big data produced cannot be used meaningfully or purposefully to meet the specific standards.*

Discussion, Implications and Suggestions

In this research on using learning analytics and ensuring equality in education, there are findings that are supported by the literature along with others of new sort. The E-school system was accepted as a tool of learning analytics in this study, which shaped the designation, implementation, and evaluation of the research process.

Taking a glance at the findings, it is clear cut that intensive mobility is valid for the first three weeks at micro, meso and macro levels during the preparation and post-preparation for a new term. At this level, despite the fact that e-school data at the micro and meso level do not provide very comprehensive information, the data can still give chief information at the macro level. In the second stage of the research, which covers the actual instructional process, it was found out that while E-school data were needed at the micro and macro levels, the routine transactions were carried out at the meso level, and e-school data were not used much. In the last stage of the research, that is to say, the end of the semester, it was discovered that general evaluations were made at micro, meso and macro levels, and E-school data became more imperative in this period.

As respects learning analytics, the macro level is the most intensive regarding both workload and responsibility. This stems from the fact that the decisions taken at this level inherently owns the capacity to interfere with the whole system and are most often controlled by policymakers. In spite of that the E-school system has countless advantages on the topic of learning analytics, it is affirmed that it might cause additional workload (Somyurek et al., 2021), it has too many procedures (Saritas et al., 2013), and it may lead to wrong means of data entry again owing to the intensive end-of-term procedures (Uysal, 2021). The accumulated literature underscores that administrators and other educational stakeholders have changing, put differently, both positive and negative viewpoints about the e-school system (Saritas et al., 2013; Yilmaz & Akbaba, 2013). Still, concerning the strategic being of this system and its capacity in relation to the richness of digital data, e-school is an indispensable form of learning analytics for the stakeholders and for all the relevant bodies.

The following suggestions can be made within the scope of the research:

- To augment digital literacy levels and to underline the most effective uses of the e-school applications, training sessions can be delivered to school principals and teachers. This can help with storing accurate data within the system in the long run.
- E-school needs to act as a tool to make the lives of the responsible parties easier-not more difficult with the unnecessary workload adding on the already heavy workload. In this regard, amendments to the overall system should be considered by the decision makers and changes to E-school should also be planned to make it more user friendly.
- The data stored in E-school is invaluable. It needs to be disseminated well and interpreted effectively to target these issues like inequality and inequity in education. Thus, regular meetings can be organized that would bring together all the responsible levels to check and delve into the data found in the system in the best possible ways.

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